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The Diagnosis and Significance of Bovine Endosalpingitis and Ovarian Bursitis

BY

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SUMMARY.—Of 252 cows discarded for failure to breed and studied at first clinically and then by a post-mortem investigation, 40 proved to be affected with bilateral bursitis, and 43 with unilateral bursitis. The accuracy of bursitis diagnosis per rectum by Murray's technique evaluated at 97 to 98 per cent. both for affected and non-affected subjects. A further 46 cows with normal bursae proved, on histopathological evidence, to be affected with endosalpingitis severely enough probably to inhibit the function of one or both of the tubes. Thus 51.5 per cent. of the whole sample had either bursitis or endosalpingitis.

The evidence suggests ascending infection after parturition trauma as the most important cause of these conditions. 75 per cent. of bilateral and 58 per cent. of unilateral bursitis cases had endosalpingitis also. In 12 unilateral cases and 18 with normal bursae, both oviducts appeared blocked; there were thus 30 such cases not apparent clinically and 70, including the bilateral bursitis cases, or 28 per cent. of the whole sample of 252 barren cows.

These figures are irrespective of the incidence of severe endometritis, which independently probably rendered 63 per cent. of the 129 cows with tube infection incapable of breeding. A further 9 per cent. with relatively normal uteri had both tubes apparently non-functional, and 11 per cent. had only unilateral persistence of function.

Among the bursitis cases, it appeared possible to restore bilateral function to 19 per cent. (40 per cent. of those with uteri approximately normal), and unilateral function to a further 7 per cent. by manual rupture of adhesions, which would have been practicable during life, so that a roughly equal proportion only might benefit should a suitable plastic operation be developed.

Fluid injection tests practised post mortem appeared efficient in demonstrating the patency of tubes microscopically normal, but indicated blockage in only 35 per cent. of the tubes which in sections appeared impassable to ova. In a small proportion of cases injection tests did indicate a blockage which was not apparent in the sections prepared from those tubes, but which did, however, seem abnormal. The disparity in the tests is attributed to the failure of scar tissue network formations to prevent fluid passage. The prospect, therefore, that a satisfactory direct tubal patency test may shortly be evolved appears doubtful, but analysis of the mean service interval lengths since the last calving, where available, provides an indirect substitute for a patency test which is undoubtedly useful in practice.

A PREVIOUS publication (Dawson, 1956) briefly recorded preliminary results in this field from the analysis of 200 cows discarded for failure to breed. The data from these, and from a further 52 cases, are now presented in greater detail for the consideration of the clinician in dairy practice, though the published review of earlier work, objects of the study, and remarks on the differentiation (readily effected) of pathological bursal adhesions from those of physiological origin, appear not to require supplementation here. The 252 attested cows, representing most British dairy breeds, were obtained on hire from 97 widely scattered farms and maintained for a period under clinical investigation. This included agglutination testing but was directed mainly towards the oestrous cyclic behaviour and manual diagnosis, by Murray's technique, of the condition of the bursae *per rectum*. The judgment formed was recorded before slaughter and collated with the *post-mortem* findings. Samples of endo-

TABLE I
ACCURACY OF DIAGNOSIS AND INCIDENCE OF POSSIBLE CAUSAL FACTORS

	Bursitis	Endosal-pingitis	Total with tubal involvement	Per cent. of total	Others	Per cent. of total
Total cows (Sections available)	80	46	126		102	
Parturition Trauma (Figs. in brackets, retained placenta)	18 (10)	6 (3)	24 (13)	19 (10·3)	8 (3)	7·8 (3)
Treated by ovarian manipulation. (In brackets, definite c.l. expulsion)	8 (6)	6 (2)	14 (8)	11 (6·4)	6 (2)	5·9 (2)
Bursal diagnosis errors	2–4	0	2–4	1·6–3·1	3–4	2·4–3·3

The bursal diagnosis errors are calculated not on 228 but on all 252 cows, showing an overall accuracy of 96·8–98 per cent.

metrium, and of oviducts taken at each of 3 levels, were preserved for sectioning. The patency of this organ was further tested by injection of dye solution by syringe from the uterine ostium (Laszlo, 1935, in pig; Simon & McNutt, 1957, in bovine). Bacteriological cultures also were made but the results from these are not now considered.

In broad outline, the findings were that 83 cows (33 per cent.) had ovarian bursitis to a degree presumed sufficient to impair tubal function, while a further 46 (18 per cent.) with normal bursae, were affected with endosalpingitis of comparable severity. The total number of cases where the tubal function seemed seriously impaired was thus 129, or 51 per cent. of the whole sample. Table I includes some data from all these cases (except 3 from which insufficient sections were available) and, for purposes of comparison, from 102 others with normal oviducts and bursae. The other 19 such cases do not appear in this table through insufficiency of relevant data, but the figures on manual diagnosis accuracy are, in fact, based on the whole series of 252 animals.

Manual diagnosis of the bursal condition was effected readily at the first examination in 75 per cent. of the cases; in the remainder, repeated examinations, involving a more highly developed sense of touch, were required to reach a judgment. Two of the errors tabulated in the series concerned normal bursae and involved 2 exceptionally fat cows; here the bursae were diagnosed as having the entrance largely obstructed by the adhesion of the two margins. The third error, less serious, comprised the diagnosis of unilateral bursitis—shallowing of an enterable cavity—in a similar cow in which the other bursa was correctly diagnosed. All these mistakes were associated with the presence of a large mass of fat at the bursal fundus which placed the entry margins under an unusual degree of tension. The fourth animal wrongly diagnosed had a small, false bursa close to the undetected normal organ on one side. In the bursitis series one cow affected on both sides was inexplicably diagnosed as normal; another, affected on one side, was thought to be affected bilaterally through the existence of an unusual septate condition of the normal bursa. In 2 others, slight unilateral constrictions of the bursa were not diagnosed in life though, had they been, they would have provided some indication of the fact that both the associated tubes were blocked. These latter errors may perhaps be considered as merely technical since both cows had previously been examined by other workers who may have broken down the bulk of the adhesions. In general, manual diagnosis was found to be highly accurate.

Aetiology

A discussion of the aetiology of bursitis in the earlier paper concluded that most of the solid evidence obtained by other workers pointed to the preponderant importance of ascending infection from the uterus and cervix, although Moberg (1954) and more recently Roberts (1957) have claimed the act of corpus luteum expulsion to be the chief cause!

For the purposes of Table I, " parturition trauma " was defined as dystocia requiring assistance, abortion due to *Brucella abortus*, stillbirth followed by leucorrhoea, and retained placenta requiring removal. Its incidence is evaluated statistically as " probably significantly " higher, both in the bursitis and endosalpingitis—normal bursae, groups, as compared with cows having normal tubes—affording evidence in strong support of the ascending infection theory of origin. The high incidence of retained placenta here, in particular, would seem to link salpingitis, through McDonald's work (1954), with functional infertility from stress. The incidence both of ovarian manipulation and of definitely established corpus luteum expulsion is undeniably higher in the cows affected tubally than in the control group, but on statistical analysis the comparison of the proportions 8/126 and 2/102 by a 2×2 contingency $\times^2$, using Yates' correction gives a *non-significant* value of 1.648 on 1df (P=20 per cent.). Furthermore, 2 of the 8 cows with tubal lesions which had expelled the corpus luteum had parturition trauma at the last calving: this bursitis had probably developed in them before the expulsion of the corpus luteum had taken place.

In an attempt to interpret the tissue sections, pathological changes were judged significant only when the evidence appeared overwhelmingly to show that the organ could not function. Thus tubal function was assumed to persist, unless the lesions appeared definitely to prevent the passage of small, ovum-sized objects through the lumen (a few exceptions are detailed below). Uterine function was assumed to persist unless all glandular and surface uterine epithelium in the section had been destroyed and there was heavy fibrosis of the endometrium with

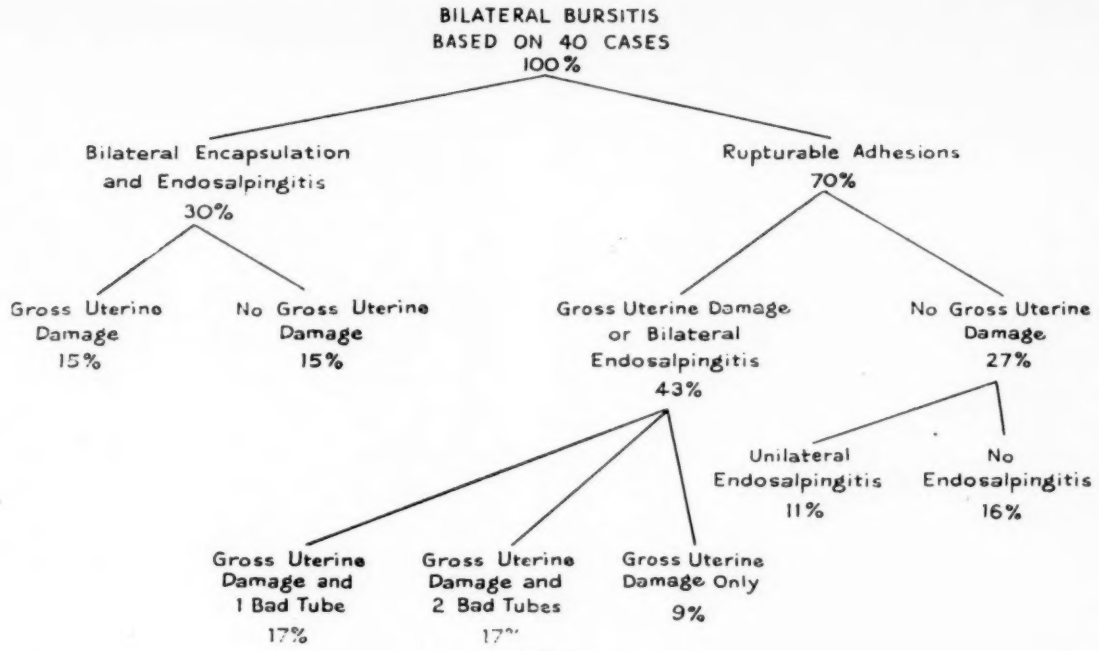


FIG. 1.

infiltration of numerous lymphocytes or pus cells. Other workers in this sphere have not always adopted such rigid standards, *e.g.* Lombard, Morgan, and McNutt (1951) define "chronic interstitial salpingitis," the appearances of which were largely ignored in the present study.

Bilateral Bursitis

An analysis of the 40 cases (see Fig. 1) indicates that 12 of these cases (30 per cent.) would have been quite incapable of breeding because both ovaries were firmly encapsulated in the bursal remains which could not be freed by manual manipulation per rectum. Nevertheless, half of these cases which had normal-looking uteri might, in theory, have bred again if a satisfactory ovarian implantation technique *via* the uterus could have been devised, and applied, before the ovaries degenerated.

As regards the remaining 28 cases (70 per cent.), the bursal adhesions, which were calculated to prevent entry of the ovum into the abdominal tubal ostium, could largely or entirely be broken down manually *per rectum*. Assuming that this had been done, 4 of the 37 sectioned cases (11 per cent.) would have had *some* prospect of breeding as the condition of one oviduct appeared to approach the normal, even in cases where encapsulation on the other side was present. Approximately 1 in 5 cases with one ovary in a capsule of scar tissue shows this possibility.

In a further 16 per cent. of the cases (6 of the 37) the breeding prospects were even better because after the rupture of the adhesions the endosalpinx approached the normal condition on both sides. Thus in 4 plus 6 cases, *i.e.* 10 of the 37 (11 + 16 or 27 per cent.) bilateral cases, there was some prospect of restored fertility on rupture. At all events, in this fraction the degree of damage to the endometrium does not seem to exceed that known to be compatible with *early* pregnancy. The remaining 43 per cent. (15 of the 37) with rupturable adhesions had no apparent chance of breeding again since either both oviducts or the endometrium (usually the latter, and often both) had suffered gross change.

Thus, in the 37 sectioned cases, all with bilateral bursitis and hence absolutely infertile in the absence of any treatment, it would have been possible by manual rupture of the adhesions to restore some prospect of breeding again to 10 only (28 per cent.). Nevertheless, 16 (44 per cent.) had relatively undamaged uteri, while in 4 others the damage was moderate: the balance, *i.e.* a further 22 per cent. approximately, might therefore be enabled to breed again by the development of an implantation operation.

In contrast to this high proportion showing uterine resolution, 18 cases had the endosalpinx grossly changed on both sides, a further 10 had similar changes on one side only, and only 9 (24 per cent.) had a relatively normal endosalpinx accompanying the bursal adhesions on both sides.

Unilateral Bursitis

Histological analysis of genitalia in 43 cases of unilateral bursitis indicates that 24 (56 per cent.) all had persistent gross uterine changes (following a lengthy "resolution interval"), which probably

would have precluded the animals from breeding. Of these 24 cases, 6 had a blocking endosalpingitis on both sides and 2 more had this on one side and adhesions on the other, making a total of 8 animals (1 in 3) with both tubes made useless; another 9 had one relatively normal tube, and encapsulation or endosalpingitis of the other. Thus the poor breeding prognosis suggested by the uterine condition was confirmed in 17 animals, or 70 per cent. of these 24 cases, by the state of the oviducts.

Of the 19 animals (44 per cent.) which did not have grossly changed uteri (though 5 showed some endometric signs, *e.g.* up to 50 per cent. of the glands invaded by leucocytes and with the epithelium destroyed), 4 had no prospect of breeding owing to bilateral endosalpingitis, and 4 others had a reduced prospect through unilateral endosalpingitis or encapsulation. Thus, only 11 cases were left (26 per cent. of those with unilateral bursitis) which retained a reasonably good prospect of breeding; 28 out of 43 animals (65 per cent.) had little or no prospect, and 4 had only a reduced or single tube prospect. This outlook is based on the assumption that adhesions are ruptured wherever possible to assist in restoring tubal function.

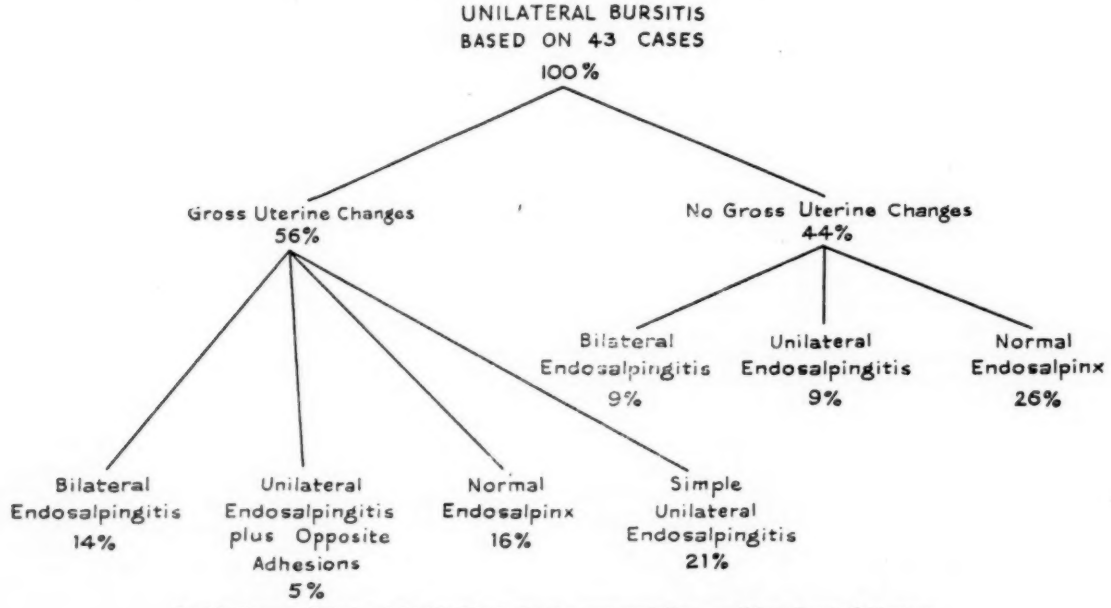
Failing such manipulation, the 19 cases retaining functional uteri analyse as follows: no breeding prospect through bilateral endosalpingitis and/or adhesions, 6; reduced (one tube) breeding prospect through endosalpingitis, encapsulation, or adhesions, 13. In this event, the percentage of unilateral bursitis cases with little or no prospect of breeding again rises to 70. Over the whole group of 43 animals where manipulation to rupture the adhesions was not carried out 14, or almost one-third, had both tubes out of action; had manipulation been carried out, 10 cases would still have had both tubes and 17 one tube unable to function, while bilateral function would have been restored to 16. As might be expected, the extent of interior tubal damage was relatively rather greater in the cows showing destruction of the endometrium.

In considering the group of 83 bursitis cases as a whole, it is noteworthy that 44 to 49 per cent. had relatively undamaged uteri, though bilateral and unilateral endosalpingitis involved each 33.75 per cent.; thus 67.5 per cent. showed tube blockage and only 32.5 per cent. were relatively normal intratubally. These figures bear out Cembrowicz's conception (1946) that the endometrium's powers of resolution are markedly superior to those of the oviduct. The view of the Swiss school (*e.g.* Erismann & Saxer, 1936), that the isthmic sphincter is very highly efficient as a safety valve against the ascension of infection, is not confirmed. The proportion of cases that might be restored to fertility by the development of an implantation operation appears on the above figures to be around 15 per cent., but more detailed analysis, taking into consideration the higher proportion of blocked tubes associated with grossly damaged endometria, raises this to about 20 per cent.

Effect of Adhesion Rupture

Over the whole group of 80 sectioned cases, out of about 37 with relatively undamaged uteri, 6 (7.5 per cent.) bilateral cases were fully restored and 6 had function restored to one tube; 9 unilateral cases had the blocked tube restored, *i.e.* a total of 21, or 25 per cent., benefited from treatment.

Assuming the elimination, which is perfectly practicable, of the cases (51 to 56 per cent.) with gross



In this diagram " Endosalpingitis " includes the encapsulation condition, 9 out of 43 cases

FIG. 2.

endometrial damage from further breeding attempts by endometrial biopsical sampling, the percentage of the remainder benefiting from adhesion rupture rises to 57, with restoration of bilateral function in 16 per cent. of the cases. The remaining 43 per cent. should in theory respond to the implantation operation, which should also further assist those in which rupture liberates but a single tube. It is noteworthy that the percentage of cases with little or no breeding prospect, following adhesion rupture but not taking implantation into account, varies little as between the bilateral condition—73 per cent.—and the unilateral—65 per cent.—the average for bursitis cases working out at 68.9 per cent. Thus the breeding prognosis must always appear grave when bursitis is diagnosed, giving at best one chance in four following adhesion rupture, while the prospect becomes appreciably worse in the presence of encapsulation, even if only one side is affected.

Endosalpingitis

In addition to the 83 bursitis cases, a further 46 cows proved to have been affected with severe endosalpingitis, although the bursae were normal. The main results from these animals are shown in Fig. 3. They indicate proportions of unilateral and bilateral involvement and association with endometritis which are broadly in line with the findings from the bursitis cases; although the proportion associated with severe endometritis (74 per cent.) appears higher than in the bursitis series, the numbers involved seem scarcely large enough to prove this increase significant. On the other hand, the view might be taken that a blockage inside the tube, by preventing further ascension of infection to the bursa and abdominal cavity, might frequently hinder the resolution process in the uterus itself. The virtual absence of relatively normal endometria in the cases having both tubes affected, is consistent with such a view. Though not shown in the figure, it was also noteworthy that in 8 of the 20 unilateral cases affected with severe endometritis, marked inflammatory changes were present also in the second oviduct, though these could not be judged severe enough necessarily to constitute a blockage. None of the 8 unilateral cases associated with relatively normal endometria were so affected which seems clearly to indicate a group of animals less seriously involved than the others.

Correlation of Fluid Injection Test Results with Appearances in Section

The low percentage of positive fluid injection tests is perhaps the most interesting result shown in Fig. 3. These amount to only 28.3 per cent. of the whole group (13 cases); in 10 of these the injection test confirmed blockage shown in sections, although in 25 of the remaining 33 cases the evidence from the sections is quite strong that, although freely permeable to fluid, the ducts were almost certainly blocked

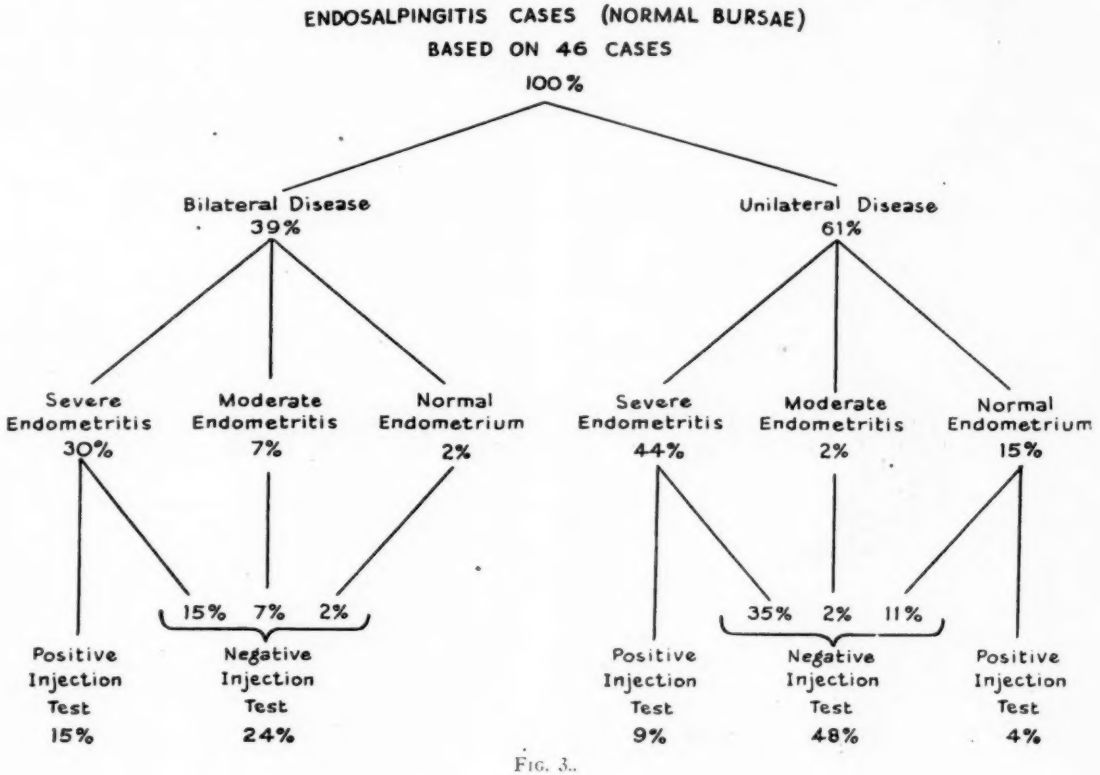


FIG. 3.

to ova. (See Plate IV). In the last 8 cases (*e.g.* Plate V) the tubal changes shown in the sections, though severe, do not convince that total blockage had occurred. In this connexion there was some evidence that, although blockage was often apparent in the sections which was not evinced by the injection test, the converse was also sometimes true. Thus in 3 of the first 13 cases (including Plate VI) strong positive injection tests were obtained, and in one of them there was earlier naked-eye evidence of obstruction, the tube being distended with retained secretion or exudate over half its length. Yet there was no convincing evidence of blockage in the sections from any of the 3 animals. In these cases it seems that the sections taken at three levels failed to include those portions of tube where the blockage was complete, and as only about one in four total blockages appear to be shown by injection tests, it is very possible that in some or all of the remaining 8 cows a total blockage may have existed at some level of the tube although not shown histologically or on injection. The inflammatory changes that are shown so resemble those accompanying blockage established by an injection in the former 3 cases, that allocation of these 8 cows to the endosalpingitis group seems justified.

To broaden the basis for the conclusions on the value of fluid injection tests, the correlation survey was extended to 20 non-encapsular bursitis cases in which, on the evidence of sections, the oviducts were similarly blocked. Once again, though less strongly, results indicated that the proportion of blocked oviducts yielding a positive injection test was quite low. These 20 cases gave 10 positive and 10 negative tests, so that the overall figure for 66 cows with blocked oviducts—exclusive of the encapsulation cases, to which the injection test is not applicable—was 23 (35 per cent.) positive and 43 negative (in the circumstances a high negative percentage of 65). A control series of 48 cows with normal uteri and oviducts yielded only 6 false positives to the injection test when examined on section. As these were mostly in the isthmus region they were probably the result of a lack of manual dexterity, or of the use of unsuitable instruments. Furthermore, *total* blockage was not present in any of these false positives.

It appears, therefore, that the fluid injection test is at least 87.5 per cent. accurate in confirming that a cow's oviducts are normal, but only about 35 per cent. accurate in determining a blockage where such a condition actually exists. Presumably in the "blockage" cases which are negative on injection there is actually only a network or septum formation as opposed to a truly solid mass: this can extend over a great part of the length of the tube, and there is every reason to expect it to prevent the passage of ova. Kvasnitzky (1956) reported bovine ova to measure 95 to 158 μ in diameter; they would thus occupy most of the space in a normal isthmus lumen. Probably, therefore, a good *in vivo* gas insufflation technique such as Hanly (1953) has described would determine the normality of normal oviducts with 100 per cent. efficiency, while it would indicate normality in the proportion, of the order of 65 per cent., of diseased organs with network or septum formation as opposed to solid block formation. A similar invalidation seems less likely to apply to the starch-iodine patency test described by McDonald (1954) because, although "*soluble*" starch is injected peritoneally, blued starch *grains* are searched for in the vaginal swabs, and these grains may be already present in the peritoneum and may approximate to ova in their tube-traversing ability. Further work on this subject is required.

Fluid injection tests were also performed on 56 cows which were classified as affected with severe endometritis but which failed to provide convincing evidence of tubal disease that would necessarily interfere with reproduction. Many of these, however, showed evidence suggestive of infection ascension by the presence of numerous pus cells in the oviducts, stripping of the epithelium, some fibrosis, and deformity and minor anastomoses of the mucosal folds. It is possible, in view of the evidence already discussed, that a total blockage is sometimes revealed by injection which is not apparent in tissue sections taken at three levels. Important tubal damage was actually present in a proportion of these cases for the incidence of (? false) positive injection tests was markedly higher than in the normal control series; even allowing for the inclusion of a number of probable technical errors, the incidence was surprisingly high at 21 cases (37.5 per cent.).

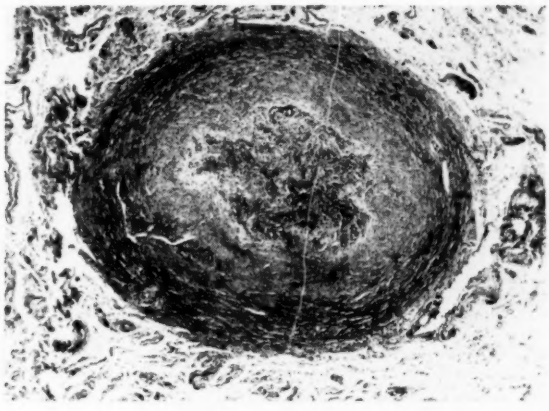
Relation of Service Interval Lengths to Genital Lesions

Since it appears from the results just discussed that direct *in vivo* diagnosis of bovine endosalpingitis is likely to be of uncertain efficiency for some time to come, any indication that might be obtainable by indirect means as to whether the oviducts were blocked or patent to ova should prove to be of undeniable interim value. In theory, in the absence of major disturbances of ovarian function, a cow with bilateral blockage of the ducts should exhibit oestrus at intervals of 18 to 25 days (Trimberger, 1956) even if served regularly, while an infertile cow with functional oviducts need not necessarily do so. Numerous authors, for example Olds and Seath (1951), and Casida (1956), have stressed the importance of early foetal death, including that which involves a return to service after 25 to 36 or more days, as an occasion of infertility. Further, assuming that about 50 per cent. of infertility is associated with blockage of the oviduct, as indicated by the present sample, the incidence of early foetal death in the remaining 50 per cent. might be expected to be greatly increased, or even doubled. For this reason the mean service interval durations (number of days between each service) for 102 cows in the different "type of lesion" groups are shown in Table II, together with supplementary data to confirm the validity of these means.

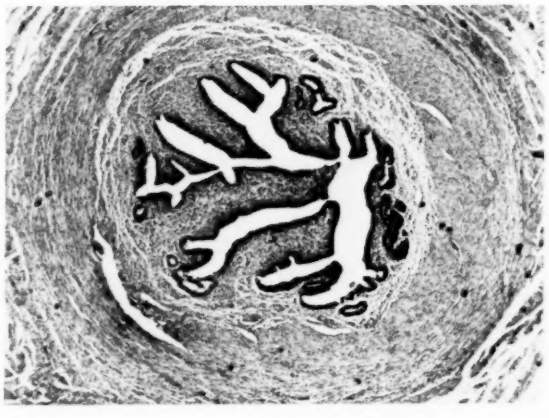
For a further 55 cows, insufficient information was forthcoming from their history to include them with the first 102. In some of these the service records had not been kept accurately enough, but in many others there had been few or no services because of

F. L. M. DAWSON.—THE DIAGNOSIS AND SIGNIFICANCE OF BOVINE ENDO-SALPINGITIS AND OVARIAN BURSITIS

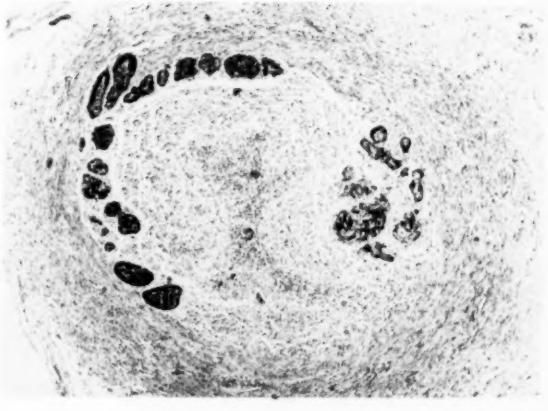
I. Oviduct, judged impassable to ova, associated with severe bursitis including partial encapsulation.



III. Total blockage of mid-oviduct, from normal bursa side of unilateral bursitis case.



II.—Normal, mid-section oviduct from severe case of bilateral bursitis with both pavilions obliterated.



IV. Blocked oviduct from normal bursa case showing survival of islands of mucous tissue, probably accounting for the permeability of this organ to fluid injection tests.

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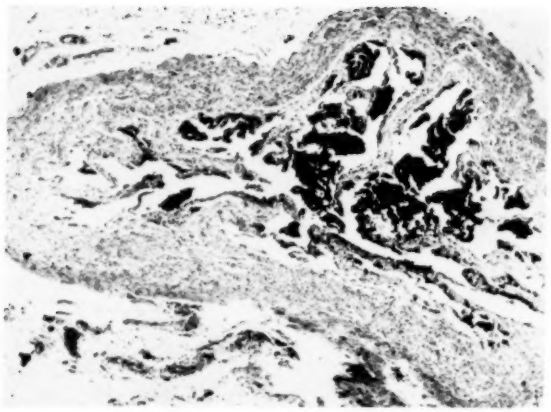
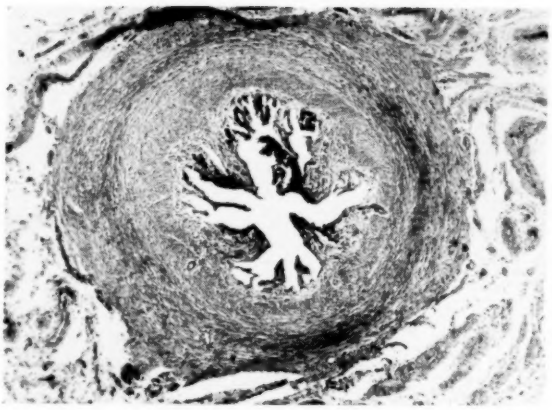
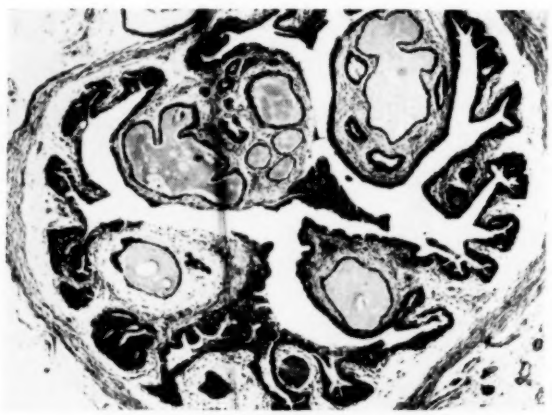


V. Oviduct showing possible appearances of mucosal necrosis and oedema or fluid exudate pressure, but presumed to be functional.



VI.—Oviduct showing de-epithelisation but appearing freely passable to ova in this region, though fluid injection test demonstrated a total blockage not far distant.



VII.—"Bladder" formation in mucosal folds (as also described by Lombard, Morgan and McNutt, 1951).

TABLE II
SERVICE INTERVAL LENGTH VARIATION IN LESION GROUPS

Lesion group	Number of "adequate data" cows in group		Average number of service intervals	Mean service interval length (days)	Maximum individual service intervals	Minimum individual service intervals	Number cows without adequate data	Ratio "adequate" / "inadequate" cows
Bilateral bursitis encapsular	27	11 — 5	5·8	27·5	11	3	5	1·0
Other bilateral bursitis		11 — 6	5·66	27·5	9	3	5	1·2
Unilateral bursitis encapsular		16 — 4	4·6	25	8	2	4	1·0
Other unilateral bursitis		16 — 12	6·5	30	11	2	12	1·0
Endosalpingitis normal bursae	22		5·0	31	13	2	11	2·0
Severe endometritis only	36		4·6	41·5	13	2	11	3·3
"Normal" uteri and oviducts	17		5·9	31	11	2	7	2·4
Total cows	102		Total cows : 102 + 55 = 157					

the severity of the genital lesions following the last calving, or on account of these suppressing oestrus. This proportion presumably accounts for the low and intermediate "adequate to inadequate data" ratio in the groups exhibiting salpingitis. A total of only 157 cows is thus accounted for, as those cows (over 80) exhibiting cystic ovarian disease and allied conditions associated with irregular, frequent, and abnormal oestrus, were unsuitable cases for the present purpose.

The mean service intervals actually arrived at conform remarkably well with the above theoretical expectations. The mean length of the service intervals which averaged over 5 per cow in the first three more seriously involved bursitis groups, at 26.7 days, scarcely exceeds the accepted maximum for the duration of a normal oestrus period. Some occurrence of suboestrus, a common condition, would readily account for the slight excess in length. In the non-encapsular unilateral bursitis and endosalpingitis groups having normal bursae where there is one patent oviduct in over half the cases, the mean length rises to 30 and 31 days, while in the two last groups, in which both oviducts were probably functional, this duration is maintained (normal uteri), or increased to 41 days (endometritis only), showing typical "early foetal death" intervals.

The establishment of early pregnancy in endometritis has been attested, *inter alia*, by Brus (1952) and Moss *et al.* (1956). The individual average intervals evaluate, in the "endometritis only" and "normal organs" groups, at 20 cows with figures suggestive of early foetal death and 33 not so suggestive—a ratio of 1:1.65—while this ratio rises to 1:4.5 in bilateral bursitis and 1:2.8 for the remaining salpingitis subjects (12 *e.f.d.*-suggestive as contrasted with 37 not, for all bursitis/salpingitis cows). Though larger numbers would yield more satisfactory conclusions, it seems especially significant that this ratio for the endosalpingitis, normal bursae cases, should be very nearly as high as that for those with unilateral bursitis (1:2.66 and 1:3, respectively). Particular interest attaches to the cases of the 13 cows with adequate data from the endosalpingitis, normal bursae (9) and unilateral bursitis (4) groups which proved to have bilateral tube-blockage on the evidence of sections. As many as 12 of these had individual mean service intervals of 19 to 25 days, with a group mean interval of 22 days, while the mean for the 13th cow, based on only 3 intervals, at 28 days only just entered the e.f.d.-suggestive zone.

Thus the lengths of the series of recent service intervals would appear to be of some real use in deciding whether or not a problem cow is in fact affected with endosalpingitis in individual cases, too, it is often possible to minimise the error, apparent in the figures now given, from such causes as suboestrus.

Acknowledgment.—Grateful acknowledgment is made of the co-operation by the A.R.C. Statistics Group, Cambridge.

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The Use of *B B* Methyl Ethyl Glutarimide for Terminating Barbiturate Anaesthesia in Calves

BY

SYDNEY JENNINGS

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SUMMARY.—The idiosyncrasy of calves in remaining recumbent for long periods after anaesthesia with so-called short-acting barbiturates is discussed. Matched pairs of calves were anaesthetised with barbiturates. One calf from each pair was used as a control and these slowly recovered and remained recumbent for periods of 20 to 30 hours. One calf from each pair received the barbiturate antagonist β β methyl ethyl glutarimide which terminated anaesthesia and the calves were able to stand within periods of 3½ to 12 minutes.*

THE anaesthetic agents which were available for use in domestic animals 25 years ago while suitable for some species were highly unsuitable for others, and there was no satisfactory means of administering a general anaesthetic to sheep. Since Kreutzer (1931) first used pentobarbitone sodium intraperitoneally in dogs, and Wright (1939) and others developed the use of barbiturates to produce general anaesthesia by intravenous injections, barbiturates have become increasingly popular for all species of animals. It is noteworthy that the short-acting barbiturates appear to be some of the few known anaesthetic agents which can be used with any degree of safety and efficacy in all the domestic animals. One of the outstanding variations in the pattern of anaesthesia produced by barbiturates is seen in calves, where the so-called short-acting barbiturates can produce prolonged anaesthesia. It was felt therefore that it would be highly advantageous if this undesirable effect could be overcome and the use of a barbiturate antagonist appeared to offer the most likely way of achieving this aim.

The antibarbiturate activity of β β methyl ethyl glutarimide (Megimide) in rodents and carnivores was first investigated by Shaw *et al.* (1954) and in man by Shulman *et al.* (1955) and since then by other workers, so that its use for accidental and suicidal barbiturate overdosage became established, and later it was used for shortening barbiturate anaesthesia in man. Turner and Hodgetts (1956) used Megimide for barbiturate overdosage in sheep and MacFarlane and Bentley (1957) used it similarly in dogs and cats. Schwartz (1957) described its use clinically in a boar. It was decided to observe the effects of Megimide on young calves after they had been anaesthetised with barbiturates.

Experimental Procedure

Ayrshire calves were grouped in pairs and matched as far as possible with regard to weight and age. Both were anaesthetised with thiopentone sodium, thialbarbitone sodium, or pentobarbitone sodium, and maintained in surgical anaesthesia for periods of between 15 and 20 minutes. One calf from each pair was then given Megimide sodium intravenously and the other calf received no barbiturate antagonist and acted as a control. In the earlier experiments the dosage rate of Megimide was based on those reported by Turner and Hodgetts (1956) who used 22.5 mg. per kg. for sheep under pentobarbitone sodium anaesthesia. At this dosage level in calves there was little or no response and it was not until the dosage was increased to a level above 50 mg. per kg. that Megimide became partially effective. It soon became clear that calves required an even larger dosage rate and so further batches of calves were given greater amounts. At first the Megimide sodium was given as a 2.5 per cent. solution in water for injection. As the dosage rate had to be increased the large fluid volume became inconvenient for injection and so finally a 10 per cent. solution in saline or distilled water was substituted.

* Megimide: A. & G. Nicholas Ltd.

Results

Table I shows that Megimide sodium was capable of terminating barbiturate anaesthesia completely in calves within a few minutes and that the animals were able to stand unaided. Control animals slowly regained consciousness over periods of several hours but remained in lateral recumbency and were unable to stand, even when lifted, until periods of 20 hours and longer had elapsed. Calves which received Megimide and were then lifted on to their feet did not relapse, and although they later adopted breast recumbency they stood voluntarily at intervals. All calves which received Megimide drank milk within 2 to 3 hours but all control calves were either incapable or unwilling to drink until 16 to 24 hours later.

The photograph (Fig. 1) shows the 4 calves 9512/1, 9514/1, 9513/1, and 9511 which were of approximately the same age and weight and which were all anaesthetised with similar amounts of thiopentone sodium. The two calves in the background received Megimide sodium after they had remained anaesthetised for 20 minutes and they were standing within 7½ minutes from the commencement of the injection.

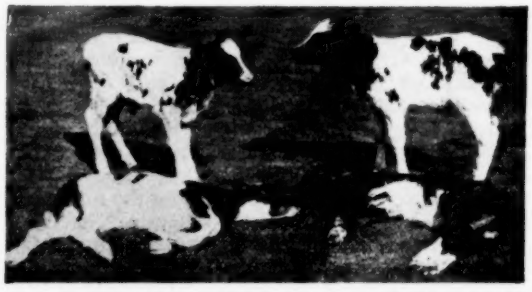

FIG. 1.—Four calves which had been anaesthetised with thiopentone sodium for 20 minutes. The animals in the background were standing within 7½ minutes of receiving Megimide sodium. The controls in the foreground were unable to stand until 21 hours had elapsed.

The two control calves in the foreground slowly regained consciousness over a period of 2 hours, remained in lateral recumbency, and were unable to stand, even when lifted, until the elapse of 21 hours and 29 hours respectively.

Discussion

Barbiturate anaesthesia in calves fulfils a useful purpose in the field, especially for such common operations as umbilical herniorrhaphy. The idiosyncrasy of calves in relation to barbiturate anaesthesia whereby they remain anaesthetised and semi-anaesthetised for long period is not without dangers and a method of terminating the anaesthesia has obvious advantages. MacFarlane and Bentley (1957) state that Megimide in cats produces an arousal from barbiturate anaesthesia but that there is a regression. No relapse occurs after termination of barbiturate anaesthesia in calves.

Acknowledgment.—I should like to thank Messrs. A. & G. Nicholas Ltd. for generous supplies of Megimide and to thank Mr. A. Finnie, Glasgow University Veterinary School Photographer, for photographing the calves.

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TABLE I

Calf	Age	Weight in kgs.	Amount of thiopentone sodium	Dosage rate	Amount of Megimide	Dosage rate	Remarks The time taken for animals to stand is calculated from the commencement of the injection of Megimide which was administered after the animals had remained anaesthet sed for periods between 15 to 20 min utes
	Days		Grammes	Mg. per kg.	Grammes	Mg. per kg.	
9512/1	10	38·2	0·75	19·5	None	—	Remained anaesthetised for 1 hour. Slowly regained consciousness over period of 2 hours. Able to stand when lifted in 21 hours, but unsteady.
9514/1	10	37·3	0·75	20·1	3·5	93·9	Able to stand when lifted after 7½ minutes. See Fig. 1.
8491	14	31·8	0·4	12·6	None	—	Unable to stand after 5½ hours. Able to stand in 20 hours.
8492	14	38·6	1·1	28·5	3·5	90·7	Able to stand when lifted after 12 minutes.
9513/1	7	36·4	0·8	21·9	None	—	Slowly regained consciousness over period of 2 hours. Lateral recumbency and unable to stand after 24 hours. Able to stand but unsteady after 29 hours.
9511	8	32·3	0·8	24·7	3·5	108	Able to stand when lifted after 5½ minutes. See Fig. 1.
9513/2	32	40·7	0·75	18·4	None	—	Lateral recumbency and unable to stand after 23 hours. Able to stand but unsteady after 31 hours.
9512/2	35	38·2	0·75	19·5	3·6	94·2	Able to stand when lifted after 7 minutes.
			Amount of pentobarbitone sodium				
	Estimated		Grammes				
7727	30	40·2	0·6	14·9	None	—	Unable to stand after 16 hours.
9514/2	34	41·0	0·7	18·3	5	121·9	Able to stand when lifted after 8 minutes.
			Amount of thialbarbitone sodium				
	Estimated		Grammes				
	84	65·5	2·5	38·2	None	—	Slowly became conscious over period of 2 hours but unable to stand after 18 hours.
9735	56	44·4	1·7	38·2	3·5	78·8	Able to stand when lifted after 3½ minutes.

The Role of the Egg as the Infective Stage of the Nematodes *Nematodirus battus* and *Nematodirus filicollis*

BY

T. E. GIBSON

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SUMMARY.—Experimental evidence is recorded showing that "embryonated" eggs of N. battus *are capable of setting up infestations in lambs but are much less efficient in this respect than free infective larvae. With* N. filicollis *it was not found possible to set up infestations using "embryonated" eggs but free infective larvae did so without difficulty.*

ATTEMPTS to set up experimental infestations of *Nematodirus battus* and *N. filicollis* in sheep have been made extremely difficult by the tardy manner in which the eggs of these species hatch in laboratory cultures. This phenomenon led to the belief that the egg containing a third-stage larva, referred to in this paper for brevity as the "embryonated" egg, might be the infective stage. Boulenger (1915) had considered this a possibility when he found that a temperature of 38° C. would cause the eggs to hatch, but subsequently he showed that hatching could be induced at a lower temperature and concluded that the free, third-stage larva was the infective stage. The work described in this paper was carried out in an attempt to decide whether "embryonated" eggs could serve as the infective stage of these two nematodes.

Preliminary Experiment

Two 8-week-old Dorset Horn lambs were used in this first experiment, the first being dosed with 100,000 infective larvae of Nematodirus spp. and the second with 100,000 "embryonated" eggs. An equal mixture of *N. battus* and *N. filicollis* was present in both the larvae and the eggs. One month following dosing daily egg counts were begun and Table I shows the results of the first week's egg counts, from which it will be seen that "embryonated" eggs are capable of setting up infestations in lambs but that they are much less efficient in this respect than are free infective larvae. This experiment was not, however, conclusive for it has been observed that gentle agitation is capable of liberating the infective larva from the eggs (Everett, 1958) and the relatively light infestation set up by the embryonated eggs could have resulted from free larvae liberated by agitation during the measuring and handling of the eggs. A second experiment was therefore set up to obtain more precise results.

Second Experiment

Three pairs of twin lambs were used, one of each pair receiving free infective larvae and the other the same number of "embryonated" eggs. Three dosage levels were employed, namely 500,000, 150,000, and 100,000 eggs or larvae. The infective larvae were a mixture of 88 per cent. *N. battus* and 12 per cent.

TABLE I

SHOWING THE NUMBER OF EGGS PER GRAMME OF FAECES OF NEMATODIRUS SPP. PASSED BY THE TWO LAMBS USED IN THE FIRST EXPERIMENT DURING THE FIRST WEEK IN WHICH FAECAL EGG COUNTS WERE CARRIED OUT

Day	Lamb which received larvae	Lamb which received eggs
1	1,300	200
2	2,100	300
3	2,100	400
4	2,900	400
5	3,200	200
6	3,200	200
7	2,500	200

N. filicollis, whilst the "embryonated" eggs consisted of a mixture of 74 per cent. *N. battus* and 26 per cent. *N. filicollis*. Dosing was carried out when the lambs were 8 weeks old and to avoid any possibility of free larvae being given along with the "embryonated" eggs they were treated with dilute Gram's iodine for 3 minutes before dosing, a treatment known to be lethal to larvae. Immediately prior to dosing the action of the iodine was stopped by adding an excess of water. Faecal egg counts were carried out on the lambs from the time of dosing until they were killed for *post-mortem* examination 3 weeks later; the numbers of eggs of *N. battus* and *N. filicollis* present in the faeces being recorded in Table II. At *post-mortem* examination the gastro-intestinal tract was removed and examined for the presence of parasitic worms, the number present being estimated by the usual dilution method. The numbers of Nematodirus species present in the lambs is recorded in Table III.

Discussion

The results in Table III show that "embryonated" eggs of *N. battus* are capable of setting up infestations in lambs but only very light infestations result compared with those which derive from an equal number of free infective larvae. "Embryonated" eggs of *N. filicollis*, however, seem to be incapable of setting

TABLE II

SHOWING THE NUMBER OF EGGS OF NEMATODIRUS SPP. PER GRAMME OF FAECES PASSED BY THE LAMBS IN THE SECOND EXPERIMENT

Days after dosing	Animals receiving larvae						Animals receiving eggs					
	320		327		328		321		326		329	
	N.f.	N.b.	N.f.	N.b.	N.f.	N.b.	N.f.	N.b.	N.f.	N.b.	N.f.	N.b.
1	–	–	0	0	0	0	0	0	0	0	0	0
4	–	–	0	0	0	0	–	–	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	–
8	0	0	0	0	0	0	0	0	0	0	–	0
11	0	0	0	0	0	0	0	0	0	0	0	0
12	–	–	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	13	0	47	0	1	0	24	0	3	0	0
15	0	100	0	200	0	1,000	0	200	0	12	0	7
16	0	71	0	700	0	1,500	0	300	0	39	0	11
17	Died		0	200	0	1,000	0	500	0	89	0	36
18			0	95	5	1,200	0	200	0	116	0	69
19			0	12	4	800	0	100	0	109	0	48
20			0	7	16	1,300	0	100	0	100	0	60
21			0	1	46	140	0	200	0	200	0	52

N.f. = Number of eggs per gramme of *N. filicollis*. N.b. = Number of eggs per gramme of *N. battus*.

TABLE III

SHOWING THE NUMBER OF WORMS OF NEMATODIRUS SPP. RECOVERED FROM THE LAMBS OF THE SECOND EXPERIMENT AT *Post-mortem* EXAMINATION

Number of animal	Number of eggs or larvae given			Number of *N. battus* present at *post-mortem* examination	Number of *N. filicollis* present at *post-mortem* examination
	Total	*N. battus*	*N. filicollis*		
320	500,000 larvae	440,000 larvae	60,000 larvae	39,700 (9 per cent.)*	16,400 (27 per cent.)*
327	25,000 larvae	220,000 larvae	30,000 larvae	32,000 (15 per cent.)*	4,900 (16 per cent.)*
328	100,000 larvae	88,000 larvae	12,000 larvae	11,100 (13 per cent.)*	1,800 (15 per cent.)*
321	500,000 eggs	370,000 eggs	130,000 eggs	7,000 (2 per cent.)*	0 (0 per cent.)*
326	250,000 eggs	185,000 eggs	65,000 eggs	1,700 (1 per cent.)*	0 (0 per cent.)*
329	100,000 eggs	74,000 eggs	26,000 eggs	600 (1 per cent.)*	0 (0 per cent.)*

* Percentage of larvae administered which reached maturity.

up infestations in lambs, and it is difficult to suggest a reason for such a marked difference in behaviour between these two closely allied species of nematode. The inefficiency of "embryonated" eggs of *N. battus* in producing experimental infestations preclude their use for this purpose since more economical use of available material can be achieved by undertaking the additional labour involved in inducing the eggs to hatch. Studies carried out at this laboratory, which are as yet unpublished, have shown that "embryonated" eggs can be recovered from pasture herbage in numbers as high as 40 per pound. It is clear from the present experiments, however, that the presence of these "embryonated" eggs on the herbage does not constitute a significant hazard to grazing lambs, the main source of whose infestation must be free-living, infective larvae.

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UNIVERSITY NEWS

Glasgow

During the Martinmas and Candlemas terms of the 1957/8 session, a series of lectures was given at the Veterinary Hospital entitled "Recent Advances in Veterinary Medicine." Thirty-four practising veterinary surgeons and members of the Animal Health Division registered for the series. The meetings were held once a fortnight at 8 o'clock in the evening, each lecture being followed by a very lively discussion.

The subjects covered during the 10 evenings were as follows:—

1. Johne's disease in cattle and sheep; Mucosal disease; Ostertagiasis in cattle. 2. The differential diagnosis of some pig diseases. 3. Diseases of young calves. 4. Oedema disease in pigs; Ketosis in cattle. 5. Immunity to parasitic disease. 6. Diseases of sheep. 7. Pneumonia in cattle, sheep, and pigs. 8. Hypomagnesaemia; Milk fever. 9. Recent advances in other countries. 10. Request programme—Some diseases of the farmyard poultry flock.

The lecturers taking part were Drs. Greig, Jarrett, and McIntyre.

Current Literature

BOOK REVIEWS

The Poultry Handbook. Published for *Poultry World* by Poultry World Ltd., Dorset House, Stamford Street, London, S.E.1. 32s. 6d.

Primarily designed as a reference book and trade directory for the poultry farmer, this handbook nevertheless contains much valuable information for the veterinary surgeon who is in close contact with the poultry industry, whether he be research worker, advisory officer, or practitioner.

The book is divided into 5 sections, of which 3 and 5 are probably the most interesting to members of this profession. Section 3 is a fairly complete reference list of addresses of poultry and allied organisations, including such useful addresses as Regional Officers of the Egg Marketing Board, N.F.U. County Branches, poultry packers, N.A.A.S. Poultry Advisory Officers, County Agricultural Executive Committees, poultry research organisations, etc. This would have been strengthened by the inclusion of the addresses of Divisional Officers of the Animal Health Branch and of the Veterinary Investigation Centres. This section also contains useful information regarding stock improvement schemes, statistical information on poultry populations, average egg prices, etc.

There is a tabulated guide to the drugs and dosage used for the prevention and treatment of various diseases. This table would have met with fuller approval had it been restricted to those drugs used as food or water additives and on direct sale to the farmer. Unfortunately, in one or two instances, it includes drugs which should only be dispensed on a veterinary prescription, and administered by parenteral injection.

The poultry farmer to-day, with the advent of micronutrients and chemotherapeutics, is frequently confused by the use of such terms as grammes per ton, parts per million, microgrammes per kilo, c.c.'s per litre, oz. per gallon, and has difficulty in converting these terms to a common denominator involving more practical domestic measures such as tablespoons per gallon or handfuls per bucket. Sets of conversion tables designed for this purpose would have been an invaluable addition to the book and an aid to those engaged in advisory work. A set of thermo-metric tables would have been equally helpful, since although most scientific articles use the metric system, commercial appliances are still fitted with Fahrenheit thermometers. One could go on indefinitely suggesting such further additions as tables for relative humidity, nutritional requirements, food consumption rates, etc.

Section 5 is a directory of addresses of manufacturers and suppliers of appliances, equipment, machinery, houses, feeding-stuffs, etc., and can be used in conjunction with Section 4 which is a buyers' guide, sub-divided under such headings as antibiotics, broiler equipment, books, egg boxes, feeding-stuffs, and in fact fairly adequately covers the whole range of the ancillary industries.

Section 1 is based on the "Efficiency Supplements" which appeared in *Poultry World*, and although dealing with such important branches of poultry farming as breeding, incubation, nutrition, hygiene, and disease, egg quality, etc., is of limited value to the veterinary surgeon since in most instances the articles have been primarily designed for lay consumption and of necessity therefore are a little superficial in their treatment. Nevertheless, such articles as those dealing with progeny testing, intensive housing, breeding systems, artificial insemination, and the control of the commoner diseases can be used as "useful refreshers" for those not in daily contact with the poultry industry.

Section 2 is an encyclopaedia of terms in general use and in most instances is an effort to define scientific terms. Parts of this might be usefully revised in any further editions, since some of the definitions referring to pathological conditions are somewhat naïve.

The book is attractively bound, and the sections conveniently divided not only by the use of coloured paper, but with the addition of tabbed index cards.

Breeding Better Cows. By CRAIG WHEATON-SMITH. Dairy Farmer (Books) Ltd., Ipswich, 1957. 16s.

This book, in the words of the author, "attempts to place cattle breeding in both its historic and scientific perspective and as painlessly as possible to explain the simple workings of heredity."

To breed better dairy cattle the familiar recommendations are given. Fancy points are damned, progeny testing is praised, linebreeding judicially used is valuable.

The book, however, is not one for veterinarians or veterinary students; it is too superficial and oversimplified. Indeed, it is doubtful whether it is possible at the moment to write a "painless" textbook on the science of animal breeding; the basic statistics are too unfamiliar to most laymen and the science itself is developing too rapidly.

Veterinarians will know that they must be prepared to study animal breeding deeply if they want a real understanding of the subject, and will not be able to advance their knowledge by reading "Breeding Better Cows." The book has not been written for them, but for practical stock-breeders to many of whom the book will be of value. It will introduce new ideas to them, and coat the often bitter contents of these pills with the sweet consolation that they are administered by a practical man.

Microdiffusion Analysis and Volumetric Error. Professor E. J. CONWAY. 4th Edition. 1957. Pp. 484. 42s.

Professor Conway describes microdiffusion techniques for many biochemical investigations on body fluids and deals exhaustively with those inaccuracies which are inherent in titrimetric methods.

This book is of considerable importance in research laboratories investigating biochemical problems where accurate analyses of very small volumes are required.

News and Comment

R.C.V.S. DAY

The annual Corporate Service and Commemoration of Benefactors of the Royal College of Veterinary Surgeons was held on Wednesday morning in the Queen's Chapel of the Savoy. The Chaplain of the College, the Reverend Cyril Cresswell, C.V.O., M.A., F.S.A., was assisted by the Reverend G. A. Willis, B.V.SC., M.R.C.V.S., and the lesson was read by the President, Mr. G. N. Gould, J.P., M.R.C.V.S.

After the Service the Annual Luncheon of the Royal College of Veterinary Surgeons was held at the Savoy Hotel. The toast of the College was proposed by the Lord Privy Seal, the Rt. Hon. R. A. Butler, P.C., C.H., M.P., and responded to by the President, Mr. G. N. Gould. The reply to the toast of the guests, proposed by the Treasurer, Mr. H. Sumner, was made by Sir James Turner, President of the National Farmers' Union.

At the conclusion, the Diploma of Honorary Associate of the College was presented to Sir Philip Morris, Vice-Chancellor of the University of Bristol.

Amongst those who accepted invitations were: The Irish Ambassador, Lord Lucas of Chilworth, Lord Merthyr, Lord Stamp, the Rt. Hon. Tom Williams, M.P., Mr. J. B. Godber, M.P., Sir Thomas Moore, M.P., Dr. H. King, M.P., Mr. A. J. Champion, M.P., Dr. Barnett Stross, M.P., Mr. J. M. Howard, M.P., Mr. T. F. Peart, M.P., Sir Hugh Linstead, M.P., and Sir James Duncan, M.P. The Presidents of the Royal College of Obstetricians and Gynaecologists, Veterinary Council of Ireland, Pharmaceutical Society and British Veterinary Association, the Vice-Chancellor of London University, Sir Charles Cunningham, Sir Hilton Poynton, Sir Edward Hale, Sir Charles Levatt-Evans, Sir Weldon Dalrymple-Champneys, Mr. W. G. Agnew, the Secretaries of the University Grants Committee, Association of Universities of the British Commonwealth, Inter-University Council for Higher Education Overseas, Royal College of Nursing, Royal Agricultural Society, Pharmaceutical Society, the Masters of the Farriers and Farmers Companies, the Chairmen of the Milk Marketing Board, Farmers Club, Fatstock Marketing Corporation, Corporation of London Marketing Committee, the Mayor of Southampton, Dr. P. Carrier, Mr. A. L. Dyke, Mr. W. G. Alexander, Mr. Bolton King, Mr. W. R. Trehane, Dr. Joseph Edwards, Mr. J. C. Nagle, Dr. N. C. Wright, Mr. W. C. Tame, Mr. C. P. Quick, and the Chaplain, the Rev. Cyril Cresswell.

R.C.V.S. RECEPTION

The President, Mr. G. N. Gould, held a small reception at the Royal College of Veterinary Surgeons on Tuesday evening, June 10th, before the opening of the exhibition in the College Library, of photographs taken by the Cambridge University Tibesti Expedition. Two of the leaders of this expedition were Members of the College to whom a grant was made by the College from the Sir Frederick Smith Fund.

Amongst those present were representatives of those Embassies, Government departments, and learned societies who assisted the expedition.

R.C.V.S. COUNCIL ELECTIONS

The result of the election was made known at the Annual General Meeting of the Royal College on Wednesday of this week, and was as follows:—

KNIGHT, Gordon Charles	1,059
WRIGHT, Alan James	981
JOSHUA, Miss Joan Olive	956
FORMSTON, Clifford	908
TUTT, John Francis Donald	845
HOLROYD, Harry	835
HOLMAN, Howard Henry	621
BELL, Frederick Rowland	544
ALLCOCK, James	411
YOUNG, Michael	358

The first five names are those of the successful candidates.

The total number of voting papers received was 1,649 of which 233 were returned by overseas members, and there were in addition 14 voting papers declared invalid.

SPECIAL MEETING OF INTERVET

At a meeting of Intervet, which was held at the headquarters of the Syndicate National des Veterinaires in Paris on May 22nd, Mr. John Pasfield, M.R.C.V.S., reports that the proceedings were opened with an introductory address by Dr. Quentin, President of the National Syndicate, who formulated a more precise interpretation of the proposed functions of the organisation, namely:—

1. To act as a sub-section of the International Office of Epizootics, and there to put the point of view of the practising veterinary surgeon. The point was made that in the last resort it was the practitioner who applied the results of research to the domestic animal and that his observations in the field were of importance.
2. To unite the interests of practitioners against those bodies which tended to usurp their functions or who prevented the veterinary profession from the full exercise of its abilities.
3. To acquaint the practising veterinary surgeon with the problems confronting his European colleagues.
4. To encourage the interchange of children of veterinary families.

In reply to a question put by Mr. Pasfield in connexion with point 1, Dr. Quentin suggested that the personnel of Intervet could be drawn from those members of the profession already attending the International Congress, if the organising committee would allocate an afternoon for this purpose.

Dr. Puhringer (Austria) then presented a paper outlining the tasks and problems confronting the veterinary profession in that country, and in the very full discussion which followed, Mr. Pasfield was asked to describe the system of liaison between the Animal Health Division of the Ministry of Agriculture and the practitioner, and the relationship

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between the veterinary and medical professions in this country.

Among those also present at the meeting were:—

Professor Verstrade, President of the National Union of Veterinary Surgeons (Belgium);

Mr. J. A. Flynn, Chief Veterinary Officer, Dublin County Council (Eire);

Dr. Ohly, President of the Veterinary Association (Germany);

Señor E. R. A. Olarte, President of the General Council of Veterinary Colleges; and

Señor F. Hernando, Secretary General of the Social Section of the G.C.V.C. (Spain);

Dr. Fritschi, President of the Federal Veterinary Office (Switzerland);

Dr. Quentin, President of the National Syndicate of Veterinary Surgeons;

Professor Verge, Director of the Central Research Laboratory;

Dr. Brevot, Secretary General of the National Syndicate of Veterinary Surgeons; and

Dr. Rossignol, Secretary General of the Order of Veterinary Surgeons (France).

THE BELGIUM VETERINARY CONGRESS

A two-day Congress sponsored by the Union Vétérinaire Belge in conjunction with the Brussels Universal Exhibition will take place on September 6th and 7th, 1958. After the official opening at 10 a.m. in Palais No. VII (Arts), Sir Thomas Dalling will address the meeting on "The Rôle of Animal Production in the Economic and Social Evolution of Man," and this will be followed in the afternoon by two papers on the rôle of veterinary medicine in a modern society given by Dr. Van der Born (Belgium) and Dr. Theisen of Luxembourg. At 8 p.m. in the evening a grand banquet will be held in the Palais de L'Elegance of the Universal Exhibition and it is hoped that there will be a good attendance of members of the profession from all parts of Europe.

On the following day delegates will pay an official visit to the Pavilion of Agriculture in the morning, and in the afternoon they will return to the auditorium of Palais No. VII to hear a paper by Professor Vuillaume, Chief of Veterinary Services in France, entitled "The Rôle of the State in the Economy of Animal Production." Dr. Willems, Director of the National Veterinary Research Institute of Belgium, will sum up the proceedings of the Congress, and the meeting will close officially at 5 p.m.

Simultaneous translations of all the proceedings will be given in English, French, German, and Dutch, and members who are interested should apply to the Bureau, Journées Vétérinaires Bruxelles 58, Diergeneeskundige Dagen Brussel 58, 35, rue de la Brasserie, Bruxelles, 5, for the full programme and application form.

B.V.A. CONGRESS GOLF COMPETITIONS

Arrangements have been made for competitions for the Simpson Trophy for men and the Dunkin Trophy for ladies to be played over the Pulrose Golf Course on the afternoon of Thursday, September 25th. Intending competitors are asked to notify Mr. R. H. Hawkins, M.R.C.V.S., of 3, Hill Street, Douglas, Isle of Man, as soon as possible.

THE REGISTER OF VETERINARY SURGEONS

Under the provisions of Section 25 (4) of the Veterinary Surgeons Act, 1948, and S.I.1729 of 1957, the name of the under-mentioned was restored to the Register of Veterinary Surgeons on May 30th, 1958:—

ALI, Syed Mahmud, Director of Animal Husbandry, 27, Nawab Katra Road, Dacca, East Bengal, Pakistan.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

ROCHE-KELLY, Francis Richard, Glandwr, Bettws Garmon, Caerns. (Major R.A.V.C. (R.O.) Retd.). Graduated London, July 19th, 1907. Died May 27th, 1958, aged 75.

PERSONAL

Births

ABRAHAM.—On April 25th, 1958, at the B.M.H., Tripoli, to Lyn, wife of Captain Brian Abraham, R.A.V.C., a second daughter.

KERRY.—On June 3rd, 1958, to Valerie, wife of John B. Kerry, M.R.C.V.S., of 304, Broadway, Bexleyheath, Kent, a daughter, Claire Suzanne.

STEELE.—To Pat, wife of Colin Steele, B.V.Sc., M.R.C.V.S., of Seaview Road, Wallasey, a son, brother for Catherine and David.

HONORARY DEGREE FOR MR. H. SUMNER

The Honorary Degree of M.V.Sc. will be conferred on Mr. Henry Sumner, F.R.C.V.S., D.V.H., at the midsummer congregation of Liverpool University in July. Mr. Sumner was a member of the teaching staff of the Faculty of Veterinary Science from 1904 to 1920, and he is a past-President of the Royal College of Veterinary Surgeons.

ANGLING IN THE ISLE OF MAN

Anglers visiting the Isle of Man for the B.V.A. Congress in September will be interested to know that, although Manx rivers are small, some excellent trout and salmon fishing is available, particularly in the autumn when runs of sea trout and salmon occur during spates. The Douglas reservoirs also hold many good trout, both brown and rainbow, and these can be fished on the payment of 1s. 6d. per day to the caretaker.

Few of the rivers have private rights but these are mentioned in the Isle of Man Board of Agriculture and Fisheries booklet, "Fishing In and Around the Isle of Man," available free on application to the Isle of Man Board of Agriculture and Fisheries, Animal Health Department, 3, Hill Street, Douglas.

Licences may be obtained in advance from the above address for fishing salmon, sea trout, and trout, and the rates are as follows:—

Per day, 2s. 6d.; per week, 3s. 6d.; per fortnight, 5s.; per month, 7s. 6d.; per season, 12s. 6d.

Excellent sea fishing is available around the Manx coasts. The British record mackerel, weighing over 4 lb., was caught at Peel, and off Port St. Mary the British record ling was landed. Bass can be caught from the beaches north of Peel as far as the Point of Ayr and also from Laxey. Fresh herring for bait is usually available in the shops in September, and lug and rag worm can be dug in Douglas bay. Crabs and limpets can be found in most rock pools.

Private transport is necessary to reach the West coast beaches but buses and trams run to Peel and Laxey. Pier fishing is available at Douglas (Victoria Pier and the Breakwater), Ramsey, Peel, and Port St. Mary.

COMING EVENTS

June

17th (Tues.). Meeting of the Western Counties Veterinary Association at the Hotel Bristol, Newquay, 2.30 p.m.

20th (Fri.). Meeting of the Society for the Study of Animal Breeding at the New Forest Hall, Brockenhurst, Hants, 10.30 a.m.

Annual General Meeting of the Lincolnshire and District Division at the Eastgate Court Hotel, Lincoln, 2.15 p.m.

Annual General Meeting of the Sussex Veterinary Society in the Old Ship Hotel, Brighton, 2.30 p.m.

25th (Wed.). Summer Meeting of the Herts and Beds Veterinary Society.

Annual General Meeting of the North of Scotland Division in the Northern Hotel, Aberdeen, 2.30 p.m.

Summer Meeting of the Mid-West Veterinary Association at the Royal York Hotel, Bath, 2.30 p.m.

26th (Thurs.). Summer Meeting of the Sussex Veterinary Society at the Cattle Market, Haywards Heath, 2.30 p.m.

Meeting of the Lakeland Veterinary Association at the Hydro, Windermere, 6.30 p.m.

July

18th (Fri.). Summer Meeting of the Yorkshire Veterinary Society in the Royal Station Hotel, York, 2.30 p.m.

September

21st to 26th (Official Opening, Monday, September 22nd). 76th Annual Congress of the British Veterinary Association in Douglas, Isle of Man.

BRITISH VETERINARY ASSOCIATION QUARTERLY MEETINGS IN LONDON

Wednesday, July 9th—No. 7, Mansfield Street

10.00 a.m. Veterinary State Medicine Committee.
11.30 a.m. Parliamentary and Public Relations Committee.
2.00 p.m. Finance Sub-committee.
3.45 p.m. Home Appointments Committee.

Thursday, July 10th—No. 7, Mansfield Street

9.30 a.m. Small-Animals Committee.
11.30 a.m. Farm Livestock Committee.
2.15 p.m. General Purposes and Finance Committee.

Friday, July 11th—Connaught Rooms, Gt. Queen Street, W.C.2

10.15 a.m. Council.

R.C.V.S. EXAMINATIONS

Wednesday, June 25th, and Thursday, June 26th. M.R.C.V.S. Written Examinations.

Friday, June 27th. M.R.C.V.S. Practical and Oral. Examinations commence (Panel " B ").

Monday, June 30th. M.R.C.V.S. Practical and Oral Examinations commence (Panel " A ").

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

Anthrax

Derbys. Town Head Farm, Flagg, Buxton (June 5).
Dunbarton. Dumbuck Farm, Bowling, Glasgow (May 30).
Lancs. Grange Farm, Parsonage Road, Wilpshire, Blackburn (May 30).
Northants. Wray Meadow, Higham Ferrers, Wellingborough (June 4).

Fowl Pest

Cambs. The Garden, Watsons Lane, Little Thetford, Ely (June 1).
Hants. Anglesey Farm, White Lane, Ash Green, Aldershot (May 31); Tote Hill, Sherfield English, Romsey (June 2).
Norfolk. The Hall, Hunstanton (May 30).
Suffolk. New Hall, Crowfield, Ipswich (June 4).
Sussex. 25, Friars Avenue, Peacehaven, Newhaven (May 30); School Lane, Poultry Farm, Eastergate, Chichester (June 4); White Lea Poultry Farm, Eastergate Lane, Walberton, Arundel (June 5).

Swine Fever

Berks. Easthampstead Park Piggeries, Bracknell (June 2).
Caerns. Railway Hotel, Cwm-y-Glo (June 2).
Ches. Manor Farm, Coole Pilate, Audlem, Crewe (June 2); The Oaks, Wythenshawe Road, Sale; Home Farm, Willington (June 4).
Denbigh. Cloy Farm, Bangor-on-Dee, Wrexham (June 2).
Essex. Blackheath Farm, Berechurch Hall Road, Colchester (May 30); Jaswang, Perry Lane, Langham, Colchester (June 2); Lords Grove, Chapel Lane, Boxted, Colchester (June 5).
Flints. Bay Tree Farm, Bronington, Whitchurch (May 30).
Kent. Hawkwood Farm, Hawkwood Lane, Chislehurst (June 3).
Leics. Hall Grip, Seine Lane, Enderby (May 30).
Montgomery. Trefnanney, Meifod (May 30).
Norfolk. The Site, Watton Green, Thetford (May 30); The Chalet, Trunch Road, Mundesley, Norwich (June 5).
Notts. Lodge-on-Wolds, Cotgrave (June 4).
Oxon. Broomhill Farm, Epwell, Banbury (June 5).
Radnor. Upper House, Rhos, Knighton (June 2); Nantygroes, Whitton, Knighton (June 5).
Shrops. New House Farm, Northwood, Wem, Shrewsbury (June 4); Hinton Old Hall, Whitchurch; Fox Hall, Maesbury, Oswestry (June 5).
Somerset. Castle View Farm, Sparkford, Yeovil; Homestead, Chancellors Farm, Redhill; Waterhouse Farm, Limpley Stoke, Bath (May 30); East Farm, Charlton Adam, Somerton; Great House Farm, Leigh-on-Mendip, Bath

(June 2); The Hollies, Bower Hinton, Martock; 14, Naish Lane, East Coker, Yeovil; Tor View, Beryl Lane, Wells (June 3).

Staffs. Lodge Farm, Birmingham Road, Shenstone, Lichfield (May 30); Boldhill Farm, Lullington, Burton-on-Trent; Brownfields Farm, Lichfield; George & Dragon Inn, Main Street, Alrewas, Burton-on-Trent (June 2); 339, Lichfield Road, Edial, Buntwood, Lichfield; Church Farm, Kings Bromley, Burton-on-Trent; Linley Cottage, Linley Wood, Rushall, Walsall; Wayside Holding, Drayton Bassett, Tamworth (June 3); 100, Lichfield Road, Brownhills, Walsall; Coton Dairy Farm, Tamworth (June 4); Corporation Farm, Curborough, Lichfield (June 5).

Suffolk. Colchester Green, Cockfield, Bury St. Edmunds (June 2); Kings Farm, Tannington, Woodbridge (June 3); Broomhayes, Belstead Road, Ipswich (June 4).

Sussex. Marlpits Holding, Ninfield, Battle (May 30); Mill House Farm, Golden Cross, Hailsham (June 5).

Warwicks. The Paddocks, Portway, Birmingham (May 30); Sheyneys Farm, Haseley Knob (June 2); Radcote Farm, Kings Lane, Stratford on Avon; Alveston Pastures, Stratford on Avon (June 4); The Piggeries, Pound Lane, Lillington, Leamington Spa (June 5).

Worcs. Temple Broughton Farm, Broughton Green, Droitwich Gabbs Farm, Rushock, Chaddesley Corbett (June 2).

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

The Incidence of Ringworm in Cattle in Northern Britain

Sir,—My attention has been drawn to a number of errors in the tables published in my paper, "A Survey of the Incidence of Ringworm in Cattle in Northern Britain," in THE VETERINARY RECORD of July 13th, 1957. I would be glad if you would publish the undernoted corrections, which do not affect the text of the paper.

Table I	3,719	should read		4,719
Table III	40,766	,,	,,	30,766
,, ,,	$P>0.50$	,,	,,	$P>0.05$
,, ,,	$P>0.01$	,,	,,	$P<0.01$
,, ,,	3.35%	,,	,,	3.25%
,, ,,	2.92%	,,	,,	2.84%
,, ,,	3.36%	,,	,,	3.25%
Table IVA	1:4.5	,,	,,	1:4.4
,, ,,	22.30	,,	,,	22.31

Yours faithfully,
E. A. McPHERSON.

Royal (Dick) School of Veterinary Studies,
Edinburgh, 9.
May 28th, 1958.

Cheyletiella parasitivorax Infestation in the Cat

Sir,—The publication of the article by M. Humphreys on *Cheyletiella parasitivorax* infestation of the dog (*Vet. Rec.* **70.** 442) prompts me to recall my interest in this mite some years ago.

In 1939, in the Parasitology Division of the Royal Veterinary College, Dr. Oldham suggested that we might try to find out the incidence of *C. parasitivorax* in the cat. Unselected cats presented at the outpatient's clinic were combed, and the combings were examined microscopically; at the same time, any discharge from the ears was also examined for the presence of *Otodectes cynotis*. The survey was abandoned owing to the outbreak of war and the consequent move, by the College, to Streatley. Up to that time, 73 cats had been examined and Cheyletiella was found on 2 of them, 3 mites being found on one animal and one mite on the other. Neither cat showed any dermatitis although one was specifically examined because the owner had skin trouble. Otodectes was found in 30 of the cats, 24 of them having a bilateral infection, one a unilateral infection, and the remaining 5 a type of infection which was not noted at the time of examination. Of the 2 cats harbouring Cheyletiella, the one that yielded the 3 mites also had a bilateral otodectic infection, while the other had no otodectic infection. As all the animals examined were "London cats" they presumably had no access to rabbits from which they might have acquired Cheyletiella.

Yours faithfully,
MYRA L. CLARKE.

Hazelmere,
Mortimer Common,
Berks.
June 6th, 1958.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN
Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th May, 1958		10	—	—	17	—	48
Corresponding period in	1957	16	1	1	31	—	31
	1956	38	—	3	19	—	49
	1955	27	—	—	16	—	86
1st January to 15th May, 1958		77	3	110	259	—	409
Corresponding period in	1957	192	3	16	353	—	307
	1956	972	3	11	238	—	282
	1955	376	—	6	225	—	570